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UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR JANUARY 1938

Vol. V, No. 3

(Not for publication)

March 1, 1938

SCREWORM CONTROL WORK DISCONTINUED FEBRUARY 15

The special educational and demonstrational work on control of screwworms, which has been carried on for the last few years, was discontinued on February 15. With the discontinuance of this work, the headquarters for screwworm control maintained at San Antonio, Tex., and Gainesville, Fla., will be closed out as early as practicable.

The extensive work conducted during the last few years in cooperation with various State agencies and individuals has made available to farmers in the areas where screwworms occur information regarding methods of control. It is believed that the stockmen and others have now had ample opportunity to become fully advised regarding the control measures, and the educational and demonstrational work will now be turned over to the State and other agencies to be handled in the same general manner as is the work concerning the control of other important pests.

FIELD HEADQUARTERS ESTABLISHED FOR GRASSHOPPER AND MORMON CRICKET CONTROL

Part of the unexpended balance of the appropriation for the control of incipient and emergency outbreaks of insect pests and plant diseases has been made available for use in cooperating with States in the control of grasshoppers and Mormon crickets. This fund will be used for the establishment of field headquarters and preliminary work incident to the organization of cooperative control work, as well as for the procurement of bait and other materials needed. Information regarding the program for cooperative work during the coming season has been made available to the State agencies. Field headquarters for grasshopper control work are being established at Minneapolis, Minn., and field headquarters for the control work against the Mormon cricket will be established at Salt Lake City, Utah. As indicated in the News Letter dated December 1, 1937 (vol. 4, no. 12), this work is under the direction of B. M. Gaddis, leader of the Division of Domestic Plant Quarantines. W. E. Dove has been selected as field leader in charge of the work on grasshopper control and will be assisted by F. D. Butcher. The field leader in charge of the work on Mormon crickets has not been selected. R. A. Roberts and K. H. Townsend, who have been associated with the work on screwworm control, are being assigned to this work.

FRUIT INSECT INVESTIGATIONS

Figs with closed eyes less subject to spoilage.--Perez Simmons and C. K. Fisher, of the Fresno, Calif., laboratory, report on examinations of figs selected for closed or wide-open eyes. The selections were made in the packing house where the figs had been graded to six sizes, but not culled, having, presumably, been culled on the ranches where they were grown. The examinations showed that the figs with closed eyes were less subject to spoilage. The samples examined to determine infestation, diseases (mold, souring, and endosepsis), and internal dirt, gave the following results:

Size	Total percentage objectionable				
	Adriatic		Calimyrna		
	Closed	Open	Closed	Open	
Standard-----	0	6	0	7	
Choice-----	2	16	0	16	
Extra choice--	0	16	3	21	
Fancy-----	2	26	5	27	
Extra fancy---	3	30	2	23	
Jumbo-----	7	39	1	31	

Of the 19,500 figs of the Adriatic variety about 3,500, of all size grades, were closed at the eye. About 1,500 of the 19,000 Calimyrna figs were closed. As the fruit was a mixture from several sources, the figures indicate that closed figs were plentiful in these leading varieties in the crop of 1937. An investigation is planned to determine the extent to which such figs occur in orchards.

Emulsifiers for ethylene dichloride.--To provide a nonsoap emulsifier for ethylene dichloride for use in localities where hard water may cause trouble with soap emulsions, O. I. Snapp and J. R. Thomson, Jr., of the Fort Valley, Ga., laboratory, have made a study of emulsifiers for use in connection with the new treatment recently developed at that laboratory for peach borer control. They found that calcium caseinate will satisfactorily emulsify ethylene dichloride when used at a rate as low as 1 pound to 5½ gallons of the chemical. Emulsions made at that rate on January 17 and diluted with water to 12½ and 50 percent concentrations, were holding up even better than soap emulsions on January 31. They also report that ethylene dichloride emulsified with potash fish-oil soap and diluted with the hardest water obtainable in central Georgia (from a lime-rock area) held up as long as emulsions of that material diluted with very soft water.

Accuracy of observers taking field records.--At the suggestion of E. R. Van Leeuwen, of the Yakima, Wash., laboratory, the accuracy of observers taking field records of fruit infested by the codling moth has been checked and the results computed by F. P. Dean. The procedure was to have each observer record separately the condition of each of 100 blemished apples, then to have a committee of experienced observers decide on the actual condition of each apple by careful examination. Based on percentage of wormy

fruit, the accuracy of observers with less than 3 years' experience was from 90.0 to 95.5 percent, and of the more experienced observers from 97.0 to 97.5 percent. Based on the number of worms per 100 apples, the accuracy was from 78 to 84 percent and 89 to 92 percent, respectively. The greater accuracy in the first instance is due to the greater ease in determining whether or not an apple is wormy than in determining the exact number of worms that have attacked it. As some of the errors were negative and some positive and therefore would cancel each other in the total results from the 100 apples used, the average accuracy of all the observers turned out to be 98 percent for percentage wormy and 93 percent for number of worms. This degree of accuracy would appear to be sufficient for the purpose for which these observations are used.

Normal trends in Japanese beetle populations as indicated by trap catches.--During the 7-year period from 1926-32, trapping was carried on in the earliest infested area in the general vicinity of Moorestown, N. J., to obtain data on trends in the adult population during the summer. I. M. Hawley and T. N. Dobbins have recently summarized these data. The number of traps employed ranged from 21 to 24 and all were in continuous use from June 15 to September 15 each year. The number of beetles caught in each 5-day period was determined for each of the 7 years. The period when the greatest number of beetles were taken was considered to be the peak of population and was expressed in the table as an index number equivalent to 100. The catches in all other periods were expressed as proportionate parts of the catch during the peak period. There was a considerable variation in the numbers of beetles caught in the different seasons. To prevent a large catch of any 1 year having a disproportionate influence in determining the average for the 7 years, the index numbers for each period for all years were summed and used in the same manner as in evaluating the yearly trap catches. It is evident from the table that the peak, or highest 5-day period, may occur at any time between mid-July and mid-August, depending largely on weather conditions. Trap catches are dependent on the number of beetles in flight and this, in turn, is influenced by temperature, humidity, sunlight, and wind velocity. On cool, cloudy, or rainy days there is little flight. When the air is humid on clear, warm days, beetles feed extensively and fly little, but they are very active under conditions of low humidity. From the normal for the 7-year period, as shown in the last column of the table, it is evident that a gradual increase in the beetle population until late July is to be expected. This is followed by a slow decline in numbers until mid-August when a sudden drop in the population occurs, followed by a gradual falling off during the remainder of the season. This relative abundance is shown in the following table.

Period	Relative abundance in--							Average 1926 to 1932
	1926	1927	1928	1929	1930	1931	1932	
June 15-19-----	--	--	--	--	1/0	1/0	--	--
June 19-24-----	--	--	1/0	0.3	0.1	1/0	0.1	0.1
June 25-29-----	1/0	0.1	0.	3.2	0.8	0.2	1.3	1.1
June 30-July 4--	0.2	0.3	0.6	9.1	4.8	1.9	8.3	5.0
July 5-9-----	2.4	2.0	4.2	48.5	27.5	4.7	25.9	22.9
July 10-14-----	11.5	10.1	3.2	2100.0	24.7	21.3	88.5	51.6
July 15-19-----	15.0	22.6	39.6	35.4	67.1	16.9	62.6	51.6
July 20-24-----	62.8	15.3	32.8	56.2	86.9	46.5	27.0	65.1
July 25-29-----	46.9	2/100.0	57.0	90.7	73.5	2/100.0	34.7	2/100.0
July 30-Aug. 3--	29.3	41.3	2/100.0	75.9	90.6	55.9	95.9	97.3
Aug. 4-8-----	2/63.9	47.9	70.1	44.3	2/100.0	33.9	2/75.0	86.6
Aug. 9-13-----	100.0	61.0	59.6	32.6	26.7	14.1	100.0	78.4
Aug. 14-18-----	37.7	11.9	51.7	17.1	8.3	17.1	44.6	37.5
Aug. 19-23-----	0.4	6.6	23.7	8.0	6.4	1.8	17.7	12.9
Aug. 24-28-----	11.5	1.6	15.2	5.8	5.8	2.6	7.8	10.0
Aug. 29-Sept. 2	6.9	6.1	8.3	1.9	4.3	1.9	3.0	6.5
Sept. 3-7-----	0.8	6.1	0.2	0.6	1.7	0.4	1.0	2.1
Sept. 8-12-----	1.0	0.7	1.5	0.4	1.3	0.3	0.3	1.1
Sept. 13-15----	0.2	0.4	0.4	0.1	0.4	0.1	0.1	0.3
Peak catch--	255,926	602,920	145,929	139,431	72,855	184,096	116,977	

^{1/} A few beetles were caught in this period but the index number was much less than 0.1 and is considered practically equivalent to 0.

^{2/} Index number of 100 shows highest catch in any 5-day period in each season. The numbers caught in this period are indicated at the bottom of each column.

MEXICAN FRUIT FLY CONTROL

Fewer Mexican fruit fly than a year ago.--Traps indicated that the population of Anastrepha ludens Loew in the Rio Grande Valley throughout January was less than one-fifth as high as for the corresponding period of 1937, only 97 individuals of this species being taken in traps. Of the 39 female flies trapped, 18 were gravid. Spraying operations were started on four large developments and several small citrus plantings the last week of the month. A spray composed of tartar emetic, sugar, and water is being applied. Fruit shipments for the season are approximately 200 cars less than last season. The total to date stands at 11,420 equivalent carloads. The numbers of fruit flies identified in January were as follows:

Species	Texas	Mexico
<u>Adults</u>		
<u>A. ludens</u> -----	97	11
<u>A. serpentina</u> Wied-----	283	16
<u>A. sp. "L"</u> -----	20	0
<u>A. sp. "Y"</u> -----	103	10
<u>Other A. sp. not ludens</u> :	7	0
<u>A. pallens</u> Coq-----	2,171	92
<u>Total</u> -----	<u>2,681</u>	<u>122</u>
<u>Larvae</u>		<u>1/</u>
<u>A. ludens</u> -----	0	1,118

1/ From market fruit.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Estimated damage by European corn borer in 1937.--A. M. Vance, Toledo, Ohio, presents the following estimates of damage to the corn crop by the European corn borer in 1937, based on crop values computed from estimated yields and current market quotations. The estimates include only the area involved in the 1937 fall survey of corn borer abundance, comprising 1,643,021 acres of corn harvested for grain and 43,480 acres harvested for sweet corn. Damage indices of 3 percent and 8 percent loss per borer per plant for grain and sweet corn, respectively, were utilized to measure the effect of the borer, the estimated total loss in 1936 for the same area being included. Resulting from differences in borer populations in the 2 years, the percentages of crop loss calculated from these indices for field and sweet corn, respectively, were 4.2 and 11.3 in 1937, and 2.6 and 6.9 in 1936. The increased loss due to the borer in 1937, as compared with 1936, was partially offset by lower market quotations in 1937. The estimates of damage by areas are shown in the following table.

Area	Field corn	Sweet corn	Total
Lake States-----	\$406,754	\$162,461	\$ 569,225
Eastern States-----	85,701	769,165	854,866
Total loss in 1937--	\$ 492,465	\$ 931,626	\$1,424,091
Total loss in 1936--	--	--	\$1,155,326

Certain spring wheats resistant to hessian fly.--E. T. Jones, Manhattan, Kans., reports that several years' work in southeastern Kansas and southwestern Missouri, in cooperation with R. H. Painter, of the Kansas Agricultural Experiment Station, have shown no variety of common winter wheat to be resistant to the hessian fly. In the same tests a very few spring wheats and a large number of hybrid selections (F₂ to F₆ generation) of crosses between the resistant spring wheat Marquillo and desirable winter varieties have shown continuous resistance in the same tests. In a search for resistant parental material, 299 foreign plant introductions of spring habit were tested for resistance at Springfield last fall. Recently completed examinations show 14 of the varieties tested to be resistant to

infestation. The remaining varieties were definitely susceptible. Varieties found resistant were: Pusa 101, Triumpho, Barletta, Candéal No. 2, Rafaela, Caliph, Lambrigg, Queen Fan, Commonwealth Champion, and F. P. I. Nos. 94511, 94571, 94570, and 94594. Further tests of these resistant varieties will be made in 1938.

JAPANESE BEETLE CONTROL

Accumulative Dutch elm disease totals.--During the 4-week period January 1 to 29, reports were received from the Dutch elm disease laboratory of 47 elms confirmed as infested with the disease. In the same period 4,656 twig samples were submitted to the laboratory for culturing. Samples in process of being cultured and on which reports were being awaited numbered 3,757 on January 29. Accumulative grand totals on this date were: Elms confirmed, 28,123; suspects collected, 209,007; dead and dying trees removed in elm-sanitation work, 2,387,997; dead and dying trees tagged for future removal, 341,658; elms removed in selective-cutting areas, 123,813; elms removed in clear-cutting areas, 1,566,659; and total elms removed to date in all activities, 4,106,591.

Special elm-sanitation projects around isolated New York infections.--In upper Westchester and Orange Counties an attempt is being made to remove all devitalized elms within a mile of isolated confirmed trees. Permissions for selective sanitation work have been obtained by the State office from the owners of most of the swamp areas around these locations. Sanitation crews will work on this basis as long as possible. Should the number of trees encountered prove to be too large for completion of the program, the trees removed will probably be limited to those showing at least 30-percent devitalization, as has previously been practiced in Orange County.

Scouting for dead and dying trees in New Jersey.--Scouting work in Warren County was discontinued about January 15 and the crews were transferred to Morris County to assist in completing the work in Washington Township. Washington and Jefferson Townships were the only unscouted townships in Morris County. Scouting for dead trees in Hunterdon County was completed by January 22. Toward the end of the month scouting was terminated in Passaic County and the crews were transferred to Bergen County. Work was also discontinued in Sussex County and the personnel assigned to elm-sanitation work in Warren County. Scouting in Bergen, Middlesex, and Morris Counties was continued into February.

Reduction in W. P. A. personnel.--In January the force of W. P. A. workers engaged in the winter elm-sanitation work in Connecticut, New Jersey, and New York and at Indianapolis, Ind., was reduced to 3,110 men, involving a lay-off of approximately 950 men since mid-December.

Clear-cutting of elms postponed pending beaver removal.--Contemplated clear-cutting of the elms in beaver ponds located in Ramsey, Hohokus, and Franklin Lakes Townships, Bergen County, N. J., have been delayed, as the State Fish and Game Commission has announced its intention of removing the beavers in these sections to a more suitable location. Were the clear-cutting to proceed now, it would be necessary to break the beaver dams to lower the water level and permit access to the elms that are to be removed.

Inspection of funeral spray discloses gypsy moth egg cluster.--Inspection at Somerville, Mass., of a funeral spray prior to its removal to Bakersfield, Vt., disclosed one egg cluster on an evergreen cutting. Wreaths containing cuttings of evergreens are always probable carriers of the moth. Other interceptions of importance made in January consisted of 32 egg clusters taken from 8 truckloads of logs being transported from Ossipee, N. H., to Johnsbury, Vt.; 18 egg masses in a carload of lumber moving from Deering Junction, Maine, to Reading, Pa.; 13 egg clusters in a carload of rocks and stumps being shipped from Readfield, Maine, to New York, N. Y.; 9 egg masses in a truckload of stumps and trees moving between the same points as the rocks and stumps; 8 egg masses in a carload of lumber originating at Deering Junction, Maine, and destined to Suspension Bridge, N. Y.; and 3 egg clusters in 2 carloads of lumber from the same point of origin consigned to Buffalo, N. Y. Egg clusters in lesser numbers were found in four other shipments of lumber and shims, making a total of 94 egg clusters removed from certified shipments during the month. Rocks, stumps, and trees in which infestations were found were among the exhibit materials certified for shipment by the Maine Fish and Game Commission to the Sportsman Show to be staged in Boston from February 5 to February 12. This exhibit will later be moved to New York City.

Increase in annual Christmas-tree inspection.--Final tabulation of records of the past Christmas-tree-inspection season shows that 763,062 trees were inspected and certified for movement to nonregulated gypsy moth areas from the lightly infested zone. This was an increase of 20 percent over the number of inspections in 1936.

Farmer to build own fumigation house.--As a solution to his problem of farm-products inspection during the adult Japanese beetle season, one South Jersey farmer decided to construct a fumigation house for the large quantities of fruits and vegetables he transports to nonregulated points in his fleet of trucks. He has received reports that growers in California are successfully using old railroad refrigerator cars as fumigating chambers, thereby reducing the expense of building air-tight structures.

Strawberry-plant-fumigation house to be constructed.--Shortly after approval on December 20, 1937, of a supplement to the Japanese beetle treating instructions authorizing the fumigation of strawberry plants for Japanese beetle larvae by means of methyl bromide liberated in an approved fumigation chamber, a large-scale grower of strawberry plants on the Eastern Shore of Maryland began plans for constructing an approved house that will accommodate large quantities of strawberry plants. This will be the first commercial attempt to fumigate strawberry plants with this type of fumigant.

Classified nurseryman enlarges azalea shed.--Results in growing potted azaleas under a screened shed apparently show such an improvement over previous methods that one large azalea grower in central New Jersey has increased the size of the screened shed he devotes exclusively to this purpose. Better control over growing conditions is claimed. The screening furnishes an ideal protection from Japanese beetles, permitting certification of all plants grown in the shed.

FOREST INSECT INVESTIGATIONS

Mild winter favors bark-beetle activity in central Sierra region.--Development and activity of mountain pine beetle broods in sugar pine stands have been but slightly impeded thus far during the winter. A field trip to the Yosemite area by G. R. Struble, of the Berkeley, Calif., laboratory, during the first week in January revealed that all stages of brood were present, from parent adults and eggs to pupae and new adults. The lowest temperature reached this winter prior to the examination was 20° F., the highest 80°. Continued mild weather in this area gives promise for an early season in 1938. New developments of the western pine beetle in ponderosa pine were also noted during this same trip. Several small groups of freshly faded trees were seen along the South Fork of the Merced River. One group contained 11 trees. In two groups examined near Wawona, Calif., heavy broods of mature larvae were found. This condition and others reported on similar sites is indicative of a build-up in western pine beetle activity.

Fecundity of green trogositid.--Mr. Struble also reports that laboratory experiments at Berkeley on *Tennochila virescens* F., an important predator of the mountain pine beetle in sugar pine, have brought out the following points on reproduction and larval development. (1) A total of 504 eggs was deposited by 9 female adults between October 19, 1937, and January 10, 1938. These adults were collected in the field from infested trees in September. (2) Dissection of 5 gravid females revealed an average of 312 eggs per individual. (3) Newly hatched larvae fed on a diet of fly larvae (*Lucilia sericata* Meig.), in experiments started on December 1, had developed to fully grown larvae by January 15.

Control directed against abundant mountain pine beetle broods.--Control work against an infestation of the mountain pine beetle in western white pine was conducted in the Smith Creek drainage of the Kaniksu National Forest, Idaho, last season. In order to ascertain the actual status of this infestation, 18 trees were felled and examined intensively. W. D. Bedard of the Coeur d'Alene, Idaho, laboratory, in reporting on the results of these examinations, states that mature broods of the mountain pine beetle were very abundant in these trees. Normally, under comparable conditions, there are from 40 to 50 insects per square foot, whereas in the Smith Creek trees there were 85 per square foot. The numbers of parasites, on the other hand, were approximately 40 percent below normal. The brood-analysis data indicate that, had this infestation been left untreated, an increase of 500 percent would have occurred in the area.

Forest-insect exhibit.--An exhibit depicting the destructiveness of forest insects has been placed in the window of the Potlatch Lumber Company at Coeur d'Alene, Idaho, by the forest-insect laboratory. This exhibit, which has caused considerable comment and attention, centers around a large painted sign telling of the annual losses of commercial timber within the Coeur d'Alene National Forest as a result of bark-beetle attacks and showing what these attacks mean in the local security of the lumber-manufacturing industry. A white pine log infested with the mountain pine beetle, with a portion of the bark removed to show the bark-beetle brood, occupies the foreground. Mountain pine beetles in the process of attacking a white pine log

are shown on freshly cut material within a glass cage. Adult beetles were reared in the laboratory for this purpose. Trays of mounted insects and bark specimens complete this exhibit.

Western pine beetle losses diminishing.--The Portland, Oreg., laboratory reports an encouraging indication in the trend of the western pine beetle epidemics in the ponderosa pine forests of Oregon and Washington. A recapitulation of the data gathered on annual cruises of permanent sample plots totaling 45,106 acres (40,160 acres in 1934) shows quite conclusively that this trend is continuing downward from the peak reached in 1932. The following table shows the number of trees killed per timbered acre on these sample plots during a 4-year period.

State	Trees killed per acre in--			
	1934	1935	1936	1937
	Number	Number	Number	Number
Oregon-----	0.335	0.218	0.161	0.138
Washington-----	.188	.054	.049	.078
Regional average--	.287	.167	.126	.119

Notwithstanding the fact that the 1937 figures are estimations of the total expected losses based on partially completed surveys, these data indicate that the bottom has not yet been reached in these infestations. However, in Washington, a slight increase in the number of trees killed on certain areas was noted this year. On the Yakima Indian Reservation, where the greatest increase was found, maintenance control work is now under way.

Cerambycids attacking fire-killed Douglas fir.---Salvage loggers in the Tillamook Burn of 1933 are becoming more and more apprehensive regarding the possible presence of Ergates spiculatus Lec., an important wood borer that frequently limits salvage of fire-killed Douglas fir in the Pacific Northwest, according to R. L. Furniss, Portland, Oreg. However, there has been no authentic record of this beetle attacking trees killed in 1933. Recently a Portland mill was reported to be cutting worn timber that originated in the Tillamook Burn. Upon investigation the borers were found to be Criocephalus sp., a cerambycid that for the last year has prevented salvage of many of the smaller trees. In some of the boards examined at the mill Criocephalus galleries had penetrated the heartwood from 1 to 3 inches.

Sprouting and infestation in old elm stumps.---R. R. Whitten, of the Morristown, N. J., laboratory, reports concerning the examination of 43 elm stumps. The trees had been cut from 3 to 4 years previously and the stumps ranged in diameter from 2 to 18½ inches. None of the stumps had been chemically treated. They were examined for evidence of sprouting and insect attack. Eleven stumps (26%) showed vigorous sprouts and five (12%) weak sprouts. Only one stump showed bark beetle attack. In it there was one gallery of Hylurgopinus rufipes (Eich.). None of the stumps had been attacked by ambrosia beetles, but 28 (65%) showed either past attack by cerambycids or contained their larvae at the time of examination. There was an average of 19 cerambycid larvae or holes through which beetles had emerged in stumps with no sprouts, as compared with 13 in stumps with sprouts.

Production and hatching of Matsucoccus eggs.--T. J. Parr, of the New Haven, Conn., laboratory, reports that some information has been obtained on the reproductive capacity of Matsucoccus sp., based on counts of complete egg masses laid by 15 females. The number of eggs laid by individuals ranged from 166 to 469, the average number per female being 293.46. Experiments to determine the percentage of hatching of the eggs are now under way. One mass of eggs held out of doors from October 27 and transferred to the laboratory at room temperature and humidity on December 23, began hatching in 16 days. Another series from the same mass placed in a covered jar at room temperature and 100-percent humidity, began hatching in 11 days. Except for mechanically injured eggs, both series hatched 100 percent. A third series collected on October 23 and held at 50° F. until January 11, when they were placed in an incubator at 70° and a relative humidity ranging from 40 to 70 percent, began hatching 14 days later.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Disappearance of snow aids gypsy moth work.--After unofficial records of -30° to -35° F. in northern Vermont in the middle of January, with correspondingly low temperatures over the remainder of the area where gypsy moth work is done, scouting conditions became better during the latter part of the month than at any time since the middle of November. Unseasonably warm weather, accompanied by a heavy rainfall on January 24 and 25, melted most of the snow in the open country in Vermont, Massachusetts, and the northern part of New York State, and in both open and woodland country in Connecticut, lower New York State, New Jersey, and Pennsylvania.

Prospective thinning work revised.--A gypsy moth control supervisor has been engaged in surveying the infested areas, together with the district superintendent in charge of the work in each State, to select localities where the greatest benefit can be obtained from the limited amount of thinning work that can be done by the small force of unskilled workers now available. Many infested areas in Massachusetts, Connecticut, and Pennsylvania have already been surveyed.

Pharmaceutical collections aid gypsy moth work.--The district superintendent in charge of Federal gypsy moth work in western Massachusetts has been informed that it is planned to cut approximately 100 tons of witch-hazel growth in Huntington during the winter. The witch-hazel bush is a favored food plant of the gypsy moth and the removal of such a large quantity from the woodlands at Huntington, near the eastern border of the barrier zone, will be of distinct benefit to the gypsy moth work in that area.

Several small infestations found near barrier zone in Vermont.--Although no gypsy moth infestations have been found during the present fiscal year in the barrier zone section of Vermont, a total of five single-egg-cluster infestations have been located in the town of Mount Holly, Rutland County, which is only one town removed from the zone area.

Progress of gypsy moth work in New York State.--At the end of December a total of approximately 8,900 acres of woodland and 32 miles of roadside had been scouted by Federal W. P. A. workers, C. C. C. enrollees, and New

York State employees in the vicinity of the infestation discovered during the present fiscal year in Hague Township, Warren County, N. Y. Three gypsy moth infestations totaling 12,068 egg clusters were located and destroyed. At the infestation discovered in 1937 in Shawangunk, Ulster County, a total of more than 11,000 acres of woodland and 69 miles of roadside was scouted, and 5 infestations totaling 11 egg clusters were found and treated. More than 6,800 acres of woodland and 53 miles of roadside were scouted in the infested area in Putnam Valley Township, Putnam County, and 4 infestations totaling 40 egg clusters were destroyed. There was a marked decrease in the density of infestation in the two latter towns, resulting from the very intensive scouting and treatment work applied during the past year.

Progress of gypsy moth work in Pennsylvania.--From the beginning of the current fiscal year to the end of December a total of approximately 112,000 acres of woodland and 58,000 acres of open country had been scouted in 30 townships in the Pennsylvania area, resulting in the destruction of more than 156,000 gypsy moth egg clusters. Nearly 90 percent of the egg clusters were found in the townships of Plains, Jenkins, and Pittston, in Luzerne County, and in Spring Brook Township, Lackawanna County.

Infestation apparently eliminated in Dyberry.--Intensive scouting in the vicinity of the gypsy moth infestation located during the fiscal year 1937 in Dyberry Township, Wayne County, Pa., was completed in January. No new egg clusters were found. Dyberry is immediately outside of the Pennsylvania quarantined area.

Scouting demonstrates value of spraying.--Because of lack of time, spraying was the only control measure used last season in a section of Plains Township, Luzerne County, Pa., where gypsy moth infestations are abundant. A crew now engaged in scouting and treatment work in that area is locating many old egg clusters, but very few new clusters are being found. The scarcity of new egg clusters in a region where infestation is general and in an area that was heavily infested the previous year emphasizes the value of spraying as an eradication measure.

Pennsylvania State gypsy moth quarantine revised.--The latest revision of the Pennsylvania State gypsy moth quarantine becomes effective on February 15. The revision provides for the division of the quarantined area into two zones, one including the towns where infestation is most abundant and the other the towns where only isolated infestations are present. This change should prove very effective and will reduce the cost of inspection and certification work.

Egg clusters creosoted by C. C. C. passes 2,000,000 mark.--From July 1, 1937, to January 8, 1938, C. C. C. enrollees creosoted 2,018,388 gypsy moth egg clusters in the 3 States in which such work is in progress. Of these, 1,852,205 were destroyed in Massachusetts, 20,519 in Connecticut, and 145,664 in Vermont. During the same period 88,475 acres were examined, and thinning or cleaning work was done on 2,437 acres.

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C. C. C. enrollees thoroughly trained before starting field work.--Before starting actual work against the gypsy moth, new C. C. C. enrollees undergo a thorough course of training. They are instructed in the proper use of snowshoes, of spurs and ropes in climbing, and of tools used in thinning work. Tree identification, which is necessary in thinning operations, is also taught. Scouts are trained in scouting formations and in searching for egg clusters, artificial infestations being used for training purposes and for efficiency ratings. While thorough training requires considerable time, this loss is more than repaid by the improvement in the character of the work performed by the specially trained men.

PLANT DISEASE CONTROL

Barberry eradication in northeastern Ohio.--In 1808, when pioneer settlers from Massachusetts and Connecticut moved westward, they settled in the five extreme northeastern counties of Ohio--Ashtabula, Lake, Geauga, Portage, and Trumbull. These early settlers brought common barberry bushes with them. Here, also, early nurseries were established and common barberry bushes were propagated and sold in large numbers. From these early plantings, barberries escaped from cultivation and have been found growing wild throughout the area. These five counties comprise an area of 2,534 square miles, 50 percent of which is wooded land, consisting of second-growth timber, slashings, and a generous supply of underbrush. In these counties 2,120,864 barberry bushes, sprouting bushes, and seedlings have been destroyed on 2,866 different properties. Two-thirds of all the bushes and seedlings destroyed in Ohio have been found in this small area. Approximately 97 percent of these bushes had escaped from cultivation, although barberry had been planted on 1,028 different properties. The high percentage of planted properties, both city and rural, is due to the great number of nurseries in Lake County that sold the plant for ornamental purposes. Of the planted locations, 243 were found in Lake County. The area would have shown a greater percentage of escaped bushes had it not been for the 80,000 barberries removed from nurseries in Lake County. These five counties have proved to be one extensive area of escaped barberry and bushes have been found on practically every square mile. The limited survey in Ashtabula and Geauga Counties and the survey in Portage and Trumbull Counties in 1937, show a marked decrease in the number of new properties and also a great decrease in the number of new bushes. More than 90 percent of the bushes found in these counties in 1937 were found on old escaped locations. These bushes were small and scattered, indicating that they had developed from seed since the last survey was made.

W. P. A. workers destroy over 12 million Ribes bushes.--R. G. Pierce, regional leader, reports that, since the beginning of the W. P. A. blister rust control project on July 1, 1935, up to and including December 1937, a total of 12,321,309 wild and cultivated currant and gooseberry bushes have been destroyed in the Southern Appalachian States by W. P. A. workers. On this phase of the work they expended 832,407 man-hours of labor and located and destroyed an average of about 15 bushes per man-hour.

Scouting for blister rust in Oregon in 1937.--Scouting was carried on extensively in southern Oregon during 1937. The major sugar pine areas were examined in an effort to obtain samples of infection conditions which would

be representative of the whole southern Oregon area. A total of 19,855 Ribes plants were inspected and 257 of this number, or 1.3 percent, were found to be infected with blister rust. Since the infected bushes were generally distributed over the entire southern Oregon sugar pine region and were not confined to any specific area, it is assumed that the samples obtained represent conditions for the region as a whole. Undoubtedly, there were many diseased bushes that were not located. As a result, it appears probable that some pine infection has taken place this year which will develop into infection centers within 3 or 4 years.

Bird Creek infection area.--In 1937 a very heavy infection area was discovered on Bird Creek in the St. Joe National Forest, Idaho. The lower part of this drainage supports mature and pole timber but the upper part comprises several thousand acres of white pine reproduction. Sample strips run throughout this reproduction show a general infection over the area. A study of the data reveals the fact that the infection decreases rapidly with the increase in distance away from the stream and that there is a definite correlation between the extent of infection and the number of Ribes per acre. Both stream-type and upland Ribes were present. In this area 25,606 trees were examined, of which 6,274, or 24.5 percent, were infected. The amount of infection according to distance from the stream is shown in the following table.

Distance (Chains)	Trees			Cankers	
	Examined	Infected	Total	Per 100 trees	examined
	Number	Number	Percent	Number	Number
0-5-----	8,462	3,261	38.5	23,524	278.0
6-10-----	7,450	1,710	23.0	5,613	75.3
11-15-----	5,047	876	17.3	2,280	45.2
16-20-----	3,581	368	10.3	724	20.2
Over 20-----	1,066	59	5.5	90	8.4
Total-----	25,606	6,274	24.5	32,231	125.9

COTTON INSECT INVESTIGATIONS

Pilosity of cotton leaves, effect on aphid infestation.--The effects of pilosity of cotton leaves and dusting with calcium arsenate on the abundance of aphids and their parasites have been studied by E. W. Dunnam and J. C. Clark at Stoneville, Miss. Previous investigations had shown that the more pilose leaves held larger quantities of calcium arsenate and retained it for a longer period than did the leaves with fewer hairs. Four varieties with an average of 1.4 hairs per square millimeter (range 0.41 to 2.43) and 4 varieties with an average of 4.7 hairs per square millimeter (range 3.79 to 6.09) of lower leaf surface were grouped as "smooth" and "pilose," respectively. Some varieties of each type were dusted 3 times, some 7 times, and others were left undusted. The aphid infestation was determined by counting the population on a 2.5-inch disc cut from the fourth leaf from the top of each of 100 plants. The results are summarized as follows:

Type of leaf	Average	Undusted series				Dusted series			
	: hairs per	: Leaves		: Para-		: Leaves		: Para-	
	: mm ²	: Aphids:infested		: siti-		: Aphids : infested:		: zation	
	: Number	: Number:	Percent	: Percent:	Number	: Percent:	Percent	: Percent	
Smooth---	1.4	: 33	: 14.5	: 35.1	: 284	: 50	: 40.7		
Pilose---	4.7	: 100	: 36.7	: 14.9	: 612	: 72	: 25.4		

The aphid population was from two to three times as great on the pilose-leafed as on the smooth-leafed varieties in both the dusted and undusted series, and from six to eight times as great on the dusted as on the undusted plants with both types of leaves. Although the aphid population was greater on the pilose varieties under all conditions, the percentage of parasitization was lower. Pilosity of the leaves, by affording a more favorable environment or through interference of parasite activity, appears to be a factor in increasing aphid population. Even though pilose varieties may not become heavily infested with aphids when not dusted with arsenicals, this condition is probably just within the bounds of natural control and the application of poisons upsets natural control more readily in the pilose-leafed than in the smooth-leafed varieties.

Experiments in cotton bollworm control.--The results of his plot experiments for the control of the cotton bollworm in 1936 and 1937 have been summarized by R. W. Moreland, of College Station, Tex. Most of the damage was caused by the second brood of bollworms from moths migrating from corn to the cotton. The damage varied considerably in different experiments, being so great in some that no cotton was picked from the check plots. Calcium arsenate, calcium arsenate-paris green mixtures, and mixtures of cube, pyrethrum, cryolite, barium fluosilicate, and calcium arsenate with sulphur were used as dusts. In 1936 the average gains from five plots receiving four and five applications of calcium arsenate were 495 pounds of seed cotton and a profit of \$16.03 per acre. Four plots receiving two and three applications showed an average gain of 431 pounds per acre. In 1937 the average gain of four plots dusted three times with calcium arsenate was 326 pounds and a profit of \$11.39 per acre. The average gain in the plots treated with the calcium arsenate-paris green mixtures during the two seasons was 373 pounds, with a profit of \$9.79. In the plots treated with the calcium arsenate-sulphur mixtures, the gains were less than in the calcium arsenate plots and in proportion to the poundage of calcium arsenate used per acre. The gains from the cube, pyrethrum, and cryolite were all much below those from the calcium arsenate. In the one experiment receiving barium fluosilicate the profit was \$11.71, as compared to \$6.03 on the calcium arsenate plot. It was not so great, however, as the average profit from all the calcium arsenate plots.

Field population of overwintering pink bollworms.--Examinations were made in December and January by A. J. Chapman, H. S. Cavitt, M. H. Hughes, and O. T. Robertson, of Presidio, Tex., to determine the population of overwintering pink bollworms remaining in the 1937 cotton fields of the Big Bend after the final picking. The surface trash and plant material above ground and the soil under the plants from 1-square-yard areas were examined separately. Twenty-five representative fields with different intensities of infestation, plant growth, and soil types were sampled at five points in each field, or a total of 250 samples of plant material and soil. The number of hibernating larvae in the cotton bolls and squares on the plants and on the soil above ground ranged from 6.2 to 123.2, with an average of 55.5 larvae per square yard, as compared to an average of 27 in 1936 and 43 in 1935. The large increase in number of worms over previous years is attributed to the generally heavier infestation and especially to the unusually large amount of unpicked cotton left in the fields because of the shortage of pickers, heavy fall rains, and the low price of cotton. Fields that continued to fruit late in the season because of late planting, varieties, soil types, late irrigation, or second growth of the plants, had a much higher population in the plant material than had fields where the cotton matured early. The larval population in the top 3 to 5 inches of the soil ranged from 1.0 to 41.8, with an average of 7.98 larvae per square yard. In 1936, 4.33 and in 1935, 12.5 larvae per square yard were found. With few exceptions, the fields with the late cotton also had the highest soil populations. Contrary to last year's results, more larvae were found in the heavier types of soil than in the lighter types. This was attributed to the fact that, because of more rains this year, the heavy soil did not crack so badly and a higher percent of larvae were near the surface and were recovered. The exceptionally heavy populations in a few late-fruited fields

increased the average number of larvae found in the soil. Eleven of the 25 fields examined contained a lower soil population than last year. Killing frost occurred on November 22, 1937, as compared to November 4, 1936, allowing the larvae to continue to increase and enter the soil for a longer period. Approximately 13 percent of the overwintering larvae were found in the soil and 87 percent above ground, which was about the same percentage as last year. None of the cotton fields were cleaned by the Bureau this fall and, owing to the uncertainty of establishing a non-cotton zone in the Big Bend, the farmers did not begin preparations for next year's plantings until very late in the season. About 1,000 acres were heavily pastured by cattle and sheep and examinations before and after pasturage showed that approximately 95 percent of the larvae overwintering above ground had been destroyed by the animals.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Inspection.--The inspection of green-boll samples has been continued at the San Antonio, Tex., laboratory throughout the month, with negative results. These samples were collected last fall in areas near the infested zones. Other samples were collected in sections where there is not sufficient cotton production to justify operation of gin-trash machines.

Destruction of stalks.--Preparations for the coming cotton crop have gone forward very rapidly throughout the lower Rio Grande Valley of Texas and considerable stub cotton has already been destroyed. A close watch is being kept of all the stub cotton remaining, to see that none of it produces fruit. In the latter part of the month there was freezing weather and a killing frost. A survey made since then indicated that all of the stub cotton had been killed back; consequently, there will be no cotton upon which any insect could propagate itself until the new crop comes in. Several hundred acres of the 1938 crop have already been planted.

Road-traffic inspection.--The road-inspection station at Marfa, Tex., was in operation throughout the month. A number of interceptions of contraband material were made but none of them were infested with the pink bollworm. The men on duty at the station report that practically all cars and trucks showed evidence of having been cleaned before reaching the station.

Wild cotton.--Owing to depletion of funds, eradication of wild cotton was discontinued at Cape Sable on January 13. At that time a considerable portion of the area had been cleaned once this season and some of it a second time. The last of the month additional funds were obtained and work has been resumed at Cape Sable. Along the west coast excellent progress has been made, practically all of the area having been cleaned once this season and several counties a second time. In a number of locations where plants previously occurred none were found. Excellent progress has also been made on the Mainland Keys, most of the area having been covered once this season. During the month 158,897 seedling and 617 sprout plants were removed, 3,210 containing bolls. Approximately 200 bolls were inspected on the Mainland Keys and 5 pink bollworm larvae were found on Key Largo and 4 on Long Key.

Thurberia-plant eradication.--The eradication of *Thurberia* plants in the Santa Catalina Mountains of southern Arizona has gone forward as usual. During the month 1,360 acres were covered and 10,272 *Thurberia* plants destroyed. This makes a total of 13,605 acres covered and 1,168,342 *Thurberia* plants destroyed in the Santa Catalina Range. The territory worked during the month has been very rough and rugged. Practically all of the plants destroyed, with the exception of seedlings and very small plants, have shown weevil infestation. In carrying on this work it is necessary to construct some roads and pack trails to reach inaccessible parts of the range. The local chief of the Forest Service has made some very complimentary remarks concerning this work, and the roads and trails are being used by forest rangers and Government trappers.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Cryolite and cuprous cyanide control tomato pinworm.--In summarizing the results of insecticide tests against *Gnorimoschema lycopersicella* Busck in California in 1937, J. C. Elmore, Alhambra, Calif., reports that cryolite and cuprous cyanide, in either sprays or dusts, were the most effective stomach poisons used against this pest. Contrary to former belief, both cryolite and cuprous cyanide protected the treated plots effectively for 60 days following the last application. Two dust or spray applications gave sufficient protection from a light pinworm infestation, whereas five applications were required in fields subject to heavy attack. It was determined that for best results, the insecticide applications should begin when the first pinworms formed leaf folds on the plants. In instances where the leaf folds became numerous before the insecticide applications were started, it was difficult to obtain satisfactory control. Nicotine sulphate, light mineral oil, a proprietary insecticide containing an aliphatic thiocyanate, and extracts containing pyrethrum, or cube, were not effective against the tomato pinworm at the dilutions tested.

Pyrethrum-oil spray reduces beet leafhopper population on seed beets.--V. E. Romney, of the Phoenix, Ariz., laboratory, reports that experiments performed last November in fields of sugar beets grown for seed in the Salt River Valley of Arizona demonstrated the efficiency of a pyrethrum-oil spray, applied in an atomized form, in killing the adults and nymphs of *Eutettix tenellus* (Bak.). In experimental plots laid out in a field representing average conditions and plant growth in the valley, an average of 97.1 percent of the leafhoppers were killed by the spray on November 5, when the daily range of temperature was from 76° to 89° F., whereas on November 27, when temperatures ranged from 66° to 74° F., an average of 91.1 percent of the insects were killed by the spray. An average of 10 gallons of spray per acre was applied in the first treatment and 6-3/4 gallons per acre in the second treatment. Some of the plots received the first treatment only, others received the second treatment only, a third group received both treatments, and other plots were left untreated. Forty-eight hours after the second application of spray the following average numbers of *E. tenellus* adults and nymphs were present per foot of seed-plant row for each set of four replications: Sprayed twice, 0.07; sprayed once (late), 0.47; sprayed once (early), 0.55; unsprayed, 5.29. In the spring an examination of these plots will be made, in cooperation with the Bureau of Plant Industry, to determine the comparative percentages of curly-top injury as a measure of the

degree of protection afforded by each of the spray treatments. The spray used in these experiments was composed of one part white mineral oil and two parts kerosene, mixed at the rate of 30 to 1, by volume, with pyrethrum extract containing 2.03 grams of total pyrethrins per 100 cubic centimeters.

Observations on cabbage worm populations.--In summarizing the results obtained in a survey of conditions relating to cabbage and cabbage worms at Baton Rouge, La., in 1936 and 1937, C. E. Smith and R. W. Brubaker report that the cabbage looper (Autographa brassicae (Riley)), the imported cabbage worm (Ascia rapae (L.)), and the larvae of the diamondback moth (Plutella maculipennis (Curt.)) constitute most of the worm population on cabbage, their relative importance being in the order named. It was found that the cabbage looper was the dominating factor on fall crops and appears late on spring crops. The imported cabbage worm is the most important, if not the most abundant, species on spring crops and appears late on fall crops in damaging numbers. The diamondback moth may become abundant on either the spring or the fall crops. The cabbage webworm (Hellula undalis (F.)), the cross-striped cabbage worm (Evergestis rimosalis (Guen.)), and several species of Agrotinae are abundant on fall crops. The importance of the larvae of the diamondback moth appears to depend a great deal on the proximity of the affected crop to the source of infestation and on natural control agencies. This species seems to spread rather slowly and thrives best during periods of dry, cool weather, especially when the temperatures are low enough to cause a check in the activity of its parasites but not sufficiently low to check its own activity. Damage caused by the cabbage webworm is confined largely to the seedlings of fall-grown cole crops. This species destroys the buds, thus rendering the plants worthless. Although the cross-striped cabbage worm is seldom sufficiently numerous to cause important damage, the infested plants are usually injured very severely, owing to the deposition of the eggs in clusters and to the gregarious feeding habits of the larvae. In addition to the losses caused by cutworms in cutting off the young plants, these worms and the corn earworm (Heliothis obsoleta (F.)) often attack the young cabbage plants when heads are forming. Plants thus injured either produce poorly shaped unmarketable heads, or may fail to form heads because of the feeding of the worms.

Pacific coast wireworm varies in duration of life cycle.--During the course of biological studies on Linonius canus Lec., E. W. Jones, of the Walla Walla, Wash., laboratory, found that 62 percent of the 1935 brood of this species reared in large outdoor cages completed their development as larvae in 1937 and are destined to emerge as adults in the spring of 1938, thus completing a 3-year life cycle. Ten percent of this brood emerged last year to complete a 2-year life cycle. The remaining 28 percent are still in the larval stage and will presumably complete their life cycle in a 4-year period. It appears, therefore, that individual wireworms originating from the same brood may complete their life cycles within periods of 2, 3, or 4 years. It was determined that when moisture conditions in the soil fell below the optimum during the summer, the wireworm populations decreased and fewer larvae transformed to adults than when optimum conditions prevailed. This phenomenon occurred particularly in fields planted to asparagus, alfalfa, and pasture.

Data on the cabbage webworm in North Carolina.--In summarizing information obtained in investigations on Hellula undalis (F.) at Chadbourn, N. C., in 1937, W. A. Thomas reports that three generations and a partial fourth developed in the Chadbourn area. The first generation is of the greatest potential importance because it functions as the primary infestation, the progeny of which attack crops grown later in the season; the second and third generations cause a maximum degree of damage because of their larger population; low temperatures retard larval development late in the fall and thus limit the degree of injury caused by the species; freezing weather is apparently not always fatal to the H. undalis adults, especially when such weather occurs intermittently during the late fall; data obtained from light-trap studies demonstrated that there were two distinct flights of adults, each with a duration of approximately 6 weeks, occurring during July-August and October-November. Distribution surveys demonstrated that the webworm is a potential pest to cruciferous crops throughout North Carolina, South Carolina, and Virginia, with the possible exception of the mountainous sections.

INSECTS AFFECTING MAN AND ANIMALS.

Relative percentage of eggs of two mosquito species in nature.--H. H. Stage reports that of 15,347 mosquito eggs taken from the soil of a prolific breeding area on Deer Island near Portland, Oreg., 35 percent were Aedes vexans Meig. and 65 percent were A. aldrichi Dyar and Knab.

Hexachlorethane shows little promise as mosquito larvicide.--W. V. King, Orlando, Fla., reports the following results of laboratory tests with a mixture of two parts of hexachlorethane and one part of talc, as a mosquito larvicide:

Species	Tests	Insecticide used	Water	Larvae
			tempera-	dead in 24
			ture	hours
	Number	Grams	Pounds	Percent
<u>Culex quinquefasciatus</u> Say--	1	0.006	1	69 : 5.0
Do-----	2	.032	5	69 : 0
Do-----	2	.063	10	68-69 : 0
Do-----	2	.320	50	68-69 : 0
<u>Aedes sollicitans</u> (Walk.)---	1	.320	50	85 : 5.0
<u>C. quinquefasciatus</u> -----	2	.630	100	68-69 : 0
<u>A. sollicitans</u> -----	2	.630	100	85 : 7.5 1/
<u>C. quinquefasciatus</u> -----	2	1.57	250	72 : 47.5(52.5) 1/
Do-----	2	3.15	500	80 : 72.5(77.5) 1/
Do-----	2	3.15	500	72 : 92.5(95.0) 1/

1/ Percent dead in 48 hours.

Specificity of organic insecticides.--In tests on the insecticidal value of organic chemicals, Roy Melvin, Dallas, Tex., reports that of 26 compounds that kill all larvae of Cochliomyia americana C. and P. in artificial media at a concentration of 0.05 percent or less, only 4 killed 50 percent or more of adults that were fed 1 percent of the chemical in honey for 3 days.

FOREIGN PLANT QUARANTINES

Verticillium wilt of carnations.--A fungus with gray conidia isolated from wilted carnations found in the Rhine district of Germany in 1929 was described as Verticillium cinerescens by Wollenweber. Already it is considered by some to be the worst disease of carnations in England. The United States imports carnations from England for propagation. As the disease may be present in the tops of plants for some days before any discoloration or other symptoms are evident, it is sometimes carried in apparently healthy cuttings and infects the soil of new beds. So far as one may determine from the literature available, the disease might be present and escape detection on imported propagating material.

Tomato diseases.--A new fruit spot of tomato was intercepted at New York on January 18 on tomatoes from Haiti. The fungus causing the spots is a Helminthosporium with much larger spores than any species described as occurring on tomato. A rotting tomato from Mexico intercepted at Nogales on January 22 was producing masses of Phytophthora spores over much of the surface. Although the species of this downy mildew genus that may occur on tomatoes from Mexico cannot well be determined without pure culture work, this specimen seemed to be P. capsici Leonian. P. capsici is known to attack a number of hosts and appears to have been increasing in economic importance during recent years.

Cercospora leaf spot of banana.--A leaf spot of banana caused by Cercospora musae A. Zimm. was described in Java in 1902. Although not reported as important in Netherlands East Indies, it has since proved to be serious in the Fiji Islands, in Australia, and in the Caribbean region. The disease was not noted in the Caribbean region until 1933, when it was found in Surinam by Gerold Stahel and in Trinidad by C. W. Wardlaw. It has been reported from Jamaica also. The rapidity with which this new disease has spread and its evident destructiveness in the Caribbean region has caused apprehension regarding the future of the numerous small plantings of bananas and plantains grown for home use in Puerto Rico, where the food supply is already a serious problem. Studies to determine what may be done to meet the situation have been started.

Green alfalfa as a packing medium.--A passenger, arriving at the port of New York on June 25, 1937, carried 11 pounds of cherries, which were seized as contraband material. The cherries were carried in a large basket and were carefully packed between layers of green alfalfa. Although no pest was found on the cherries, living larvae of the alfalfa weevil (Hypera postica Gyll.), thrips, aphids, and cecidomyiid larvae were among the 10 interceptions made on the 4 pounds of green-alfalfa packing.

Entomological interceptions of interest.--Two living larvae of the Mexican fruit fly (Anastrepha ludens Loew) were intercepted at Laredo, Tex., on September 8, 1937, in a pomegranate in baggage from Mexico. Nine living larvae of the Mediterranean fruit fly (Ceratitis capitata Wied.) arrived at Port Arthur, Tex., on November 17, 1937, in four oranges in ship's stores from Spain. Living specimens of Anaphothrips orchidaceus Bagn. were taken at Honolulu, Hawaii, on October 16, 1936, on an orchid, Phaius ashworthianus, in express from England. A living larva of the bean pod borer (Maruca testulalis Geyer) was intercepted at San Francisco on August 16, 1937, in a string bean in ship's stores from Japan. Two adults of Apion craccae L. arrived at Mobile, Ala., on December 21, 1937, in vetch accompanying straw packing in cargo from Scotland. This weevil was reported as attacking vetches and oats in Russia. A larva of the oecophorid Endrosis lacteella Schiff. was found at Baltimore on October 21, 1937, in a hyacinth bulb in cargo from the Netherlands. Living specimens of the mirid Ceratocapsus punctulatus Reut. were taken at Brownsville, Tex., on October 31, 1937, on chrysanthemums in baggage from Mexico. A living adult of the silky cane weevil (Metamasius sericeus Oliv.) was intercepted at New Orleans on November 4, 1937, with banana debris in cargo from Mexico. Living adults of Bruchus viciae Oliv. arrived at New York on October 22, 1937, in vetch seed contaminating straw jackets in cargo from Italy. The coccid Pollinia pollini (Costa) was taken at Washington, D. C., on October 28, 1937, on an olive leaf in the mail from Italy. Sixteen living larvae of the West Indian sweetpotato weevil (Euscepes postfasciatus Fairm.) were intercepted at Eagle Pass, Tex., on November 22, 1937, in sweetpotatoes in baggage from Mexico. This weevil was formerly known as Euscepes batatae Waterh.

DOMESTIC PLANT QUARANTINES

Progress in standardization of State plant quarantines.--Various State plant quarantines of several southern States are being standardized, or in some instances revoked, as an outcome of concerted action to this end on the part of the quarantine committee representing the Southern Plant Board at the meeting held at New Orleans on February 3 to 5.

Grasshopper-control project started.--Cooperating State agencies are being contacted for the purpose of setting up control organizations, and an initial supply of poison-bait materials will be made available in all areas of heavy infestation in advance of grasshopper egg hatching.

Mormon cricket project contemplated.--A cooperative Federal-State project for the protection of crops against the Mormon cricket is contemplated, with field headquarters at Salt Lake City. The general plan of operation provides that the States will furnish mixing plants and power dusters, dusting materials, oils, storage for materials, and transportation of laborers, supplies, and materials. Federal funds may be used for supervision and labor and for supplemental light-dusting units. The work will be limited to such States, counties, and communities as provide cooperation.

Funds provided to continue work on white-fringed beetle.--To carry on control activities for the remainder of the fiscal year, \$135,440 has been allotted to the white-fringed beetle project from the appropriation provided

for the control of emergency outbreaks of insect pests and plant diseases. The infested States are cooperating by allotting special funds to the project or by assigning inspectors and laborers. In addition to continuing the type of control measures carried on in the 1937 campaign against the white-fringed beetle, several additional measures will be undertaken including the use of weed killers, flame throwers, metal barriers, and the recommended adoption of selective cropping and special cultural practices. The use of cheap crude oil, it is believed, will be the most practical, economical, and perhaps the most effective weed-killing agent for most of the infested area. Chemicals will be applied on uncultivated open land, and on undergrowth in timber land. Nonpoisonous chemicals will be used on areas exposed to livestock and on vacant city lots. Standard sprayer machines with necessary modifications will be used for applying weed-killer chemicals. The use of flame throwers for destroying beetles, as well as host plants, will be undertaken when the beetles emerge and before egg deposition, and, if their use is found to be practicable, will be repeated at about 10-day intervals. Several types of equipment will be tried for this work, consisting of knapsack burners for marginal and inaccessible areas; two-wheeled hand-operated burners for city lots and similar areas; two-wheeled mule-drawn burners equipped with leads of long hose and nozzles for use on roads and similar strips; larger units mounted on pick-up trucks equipped with boom with fixed burners and supplemented by burners affixed to long lines of hose for reaching inaccessible spots (this machine will also be used for distributing weed-killing chemicals); and caterpillar tractors equipped with flame throwers and weed-killing equipment for use on areas inaccessible to trucks. Selective cropping and cultural practice will be recommended to farmers in the infested area. At a recent meeting of 200 farmers all agreed to eliminate favored host plants to the extent possible and to adopt cultural practices most suitable to beetle control. Residents of Florala, Ala., are giving excellent cooperation in agreeing to discontinue growing vegetable and garden plants of any kind in city gardens after June 1, leaving such areas available for control measures. A large lumber company in the infested area has removed from cultivation over 1,100 acres of cultivated land in the interest of the project, permitting vegetation to be kept down and barriers to be erected. The use of metal barriers against migrating beetles will be undertaken on certain types of infested areas where trenching is impracticable.

No living adults of the white-fringed beetle at Saucier, Miss.--Inspection for Naupactus at Saucier, Miss., in January resulted in finding no adults in the field where they were numerous on November 23.

Another shipload of Argentine bones inspected for white-fringed beetle.--Inspectors who examined the debris from approximately 126 tons of animal bones that arrived at New Orleans on January 6 from a town near Buenos Aires, report finding increased numbers of both insects and species over the numbers in the cargo that arrived on November 20, but no white-fringed beetles were found. Half the cargo consisted of field bones with animal matter and soil adhering to them; the remainder of treated packing-house bones. About 9 tons of debris taken at random from the field bones and 2 tons of debris from the packing-house bones were screened and examined.

Sweetpotato weevil.--Fields on infested properties throughout the States of Alabama, Georgia, Mississippi, and Texas where intensive eradication work is carried on are now in excellent condition, following the campaign of vine removal after harvest and replowing in winter to expose any remaining potatoes to killing frost. Growers are disposing of stored sweetpotatoes in order to lessen the possibility of carrying over an infestation, and inspectors are assisting them in locating their seedbeds at a safe distance from the old infested properties. Twelve infestations were found in January.

Treated logs found infested with gypsy moth.--Five gypsy moth egg masses were recently found on a shipment of birch logs consigned to Washington, D. C., from a point in Massachusetts, and one egg cluster on a log shipped to a point in New Jersey by the same consignor. Although the logs, which were shipped as firewood, had been treated to produce colored flame, the infestations were found on the uncertified logs and the shipments were intercepted by the Boston transit inspectors.

Phony peach disease reduced 84 percent.--An examination of the results of the 1937 inspection activities shows that in the 14 infected States there was a reduction of nearly 84 percent over last year in the number of trees found infected. Inspection was made in 1937 of all properties that had been found infected in 1936 and also of outlying areas. In the lightly infected States 362 counties were worked, as compared with 360 in 1936. Of the peach nursery stock located in areas inspected for the phony peach disease in the 1937 season, 99.5 percent met the certification requirements for interstate movement. Action on the part of the various States in establishing and enforcing uniform quarantines and local eradication areas has effected outstanding accomplishments in the campaign against this disease. Supplemental allotments for the continuance of projects relating to phony peach and peach mosaic diseases, respectively, have been granted from the emergency relief appropriations for the remainder of the fiscal year. Nurserymen have been very active in effecting the removal of diseased trees from neighboring properties, replacing the trees in many instances with clean stock. All States in the lightly infected area have contributed freely of funds to carry on the work.

Status of peach mosaic infections.--The cooperative peach mosaic inspection work conducted in 1937 jointly by the Bureau and the several States has revealed an extension of infected areas in certain States. Infection was found for the first time in Oklahoma in a county adjacent to an infected county in Texas. The mosaic disease was also found in one additional county in California, one in New Mexico, and in several additional counties in Arizona and Texas. However, careful inspection in many Texas counties previously reported as infected resulted in finding no mosaic disease.

Citrus canker work.--Citrus canker was found in January on three properties in La Fourche and Terrebonne Parishes, La. These properties are located in an old area of canker infection. Recurrent infections were also found on young seedlings on two properties in Brazoria County, Tex. Although these findings show the necessity of continued persistent search for the disease, a comparison of the 1937 situation with that of 1936 shows a decrease

of 74 percent in the number of trees found with canker in the two States. More funds have recently been allotted from the emergency relief appropriation for continuing the work of abandoned-tree removal in the two infected States.

CONTROL INVESTIGATIONS

Plant extract found to be toxic.--W. N. Sullivan, G. L. Phillips, and E. R. McGovran, of the Beltsville, Md., laboratory, report that an extract of the fruit of the Amur cork tree (Phellodendron amurense) of China and Japan, showed considerable toxicity when tested against mosquito larvae and the house fly. The material tested was prepared by H. L. Haller, of this Bureau, from the residue left after E. K. Nelson, of the Bureau of Chemistry and Soils, had distilled the volatile oils from the fruit. Against mosquito larvae the extract was more toxic than was a derris standard containing 5.2 percent rotenone. Tests against the house fly showed the material to be about as toxic as the derris standard. A single spray test indicated that this material possessed low toxicity to southern armyworm larvae, but this also applies to derris and pyrethrum. This extract is a fast-acting poison, much like pyrethrum. The results of these tests are encouraging, as it is probable that only a small percentage of the extract contained the toxic principle. The Soil Conservation Service is interested in the possibility of using the tree for soil conservation.

Dormancy believed essential to laboratory rearing of certain insects.--Some interesting observations on the hibernation of insects have been made by M. C. Swingle, of the Sanford, Fla., laboratory, who reports that a stock of the cross-striped cabbage worm has almost completely died out after being reared for about 10 consecutive months in the laboratory. The stock became so badly diseased that it was impossible to rear the larvae even in an open plot in the field. Meanwhile it was observed that larvae collected in the field were entirely immune to the disease. It was then discovered that larvae in the field normally experience a dormant period brought on by lower temperatures and other factors, and it is assumed that this rest period is required for regeneration of the species. Considerable difficulty has been experienced at times in rearing the imported cabbage worm and it now appears that an enforced dormancy may correct these difficulties also. In this locality factors other than temperature may force the species into hibernation.

INSECTICIDE INVESTIGATIONS

Determination of rotenone in derris and cube.--H. A. Jones, of this Division, and J. J. T. Graham, of the Food and Drug Administration, have recently published (Indus. Engin. Chem. Analyt. Ed., vol. 10, no. 1, pp. 19-23. Jan. 15, 1938) the results of a study of the extraction of rotenone from derris and cube roots. They find that chloroform is the best solvent. In order to extract all rotenone from a sample, it is exceedingly important that it be ground sufficiently fine, so that at least 95 percent passes a 60-mesh sieve. Samples containing a high ratio of rotenone to total extractives were found to be more difficult to extract than those with lower percentages of rotenone. When the ratio of rotenone to total extract was about 40 percent or over, particularly in the case of

derris roots, it was necessary to employ extraction at room temperature with successive lots of chloroform in order to obtain satisfactory extraction of the rotenone. This method should also be employed as a check whenever there is doubt as to the completeness of extraction by the aliquoting procedure. Cube roots in general are more readily extracted of their rotenone content than are derris roots. The moisture content of derris and cube roots as received in this country has not been found to be sufficiently great to interfere with their analysis, hence preliminary drying of samples seems unnecessary.

Determination of small amounts of nicotine.--L. D. Goodhue has described (Indus. Engin. Chem. Analyt. Ed., vol. 10, no. 1, pp. 52-54. Jan. 15, 1938) a new method for the turbidimetric titration of small amounts of nicotine. The unknown nicotine sample is added to an excess of silicotungstic acid and the excess of the latter is titrated with standard nicotine formate. Results that check to about 5 micrograms can be obtained. Flocculation of the precipitate is prevented by the addition of Irish moss extract, and the tendency to crystallize is retarded by using formic acid instead of hydrochloric acid, as in the analysis by the gravimetric method.

New compound of rotenone.--United States Patent 2103195 was granted on December 21, 1937, to H. A. Jones on a new chemical compound composed of a monomolecular combination of rotenone and dichloroacetic acid, $C_{23}H_{22}O_6 \cdot C_2H_2O_2Cl_2$. It is believed that this new compound will not only prove valuable as an insecticide but will also provide a new method of analyzing derris root, inasmuch as it can be accurately titrated with standard alkali.

New copper-arsenic insecticides.--F. E. Dearborn on January 4, 1938, was granted United States Patent 2104584 on certain new compounds of copper arsenite and a copper salt of a higher unsaturated fatty acid. These compounds, which resemble paris green, are practically insoluble in water and are suitable for insecticidal and fungicidal use.

Nicotine-peat process patented.--United States Patent 2107058 was granted on February 1, 1938, to L. E. Markwood. This patent covers the process for preparing nicotine-peat, which consists in washing peat with an acid and then contacting the peat with an aqueous solution of nicotine. Nicotine-peat contains the nicotine in a form largely insoluble in water.

Is cube equal to derris as an insecticide?--R. C. Roark has reviewed (Soap, vol. 14, no. 1, pp. 111-113, 120. January 1938) the reports of about 30 investigators who have compared the insecticidal action of derris with that of cube of equal rotenone content. Laboratory and field tests indicate that in the control of some insects derris gives better results than does cube of the same rotenone content, whereas other insects appear equally susceptible to derris and cube. Any insecticidal superiority of derris over cube is more than offset by the present difference in price, which is 11 or 12 cents per pound. More economical control of those insects susceptible to rotenone can be obtained with cube than with derris.

BEE CULTURE

Chemical and physical analyses of western beeswaxes.--Geo. H. Vansell, of the Pacific Coast Bee Culture Field Laboratory, Davis, Calif., who has been working in cooperation with C. S. Bisson, of the University of California, reports that western beeswaxes have been subjected to chemical and physical analyses and to tests for the removal of foreign solids and colors. Pure wax obtained by stimulative feeding has uniform characteristics and lacks color. As the adsorption or mixture of materials increases, the characteristics progressively diverge from those possessed originally. Contact with metals, particularly iron, and certain pollens causes the wax to become discolored with browns and yellows. The yellow colors of almost infinite variety occurring in crude beeswax are traceable almost entirely to the liberation of yellow wax-soluble constituents by pollens. The red, blue, and purple pollens investigated did not discolor the wax. Admixture of propolis in wax greatly changes it because this substance possesses characteristics differing radically from beeswax; for example, the acid number of propolis is in some cases six times that of wax and it sinks in water, whereas wax floats (specific gravity 1.180 to 0.963). Treatment of crude beeswax with dilute acids greatly facilitates the cleaning of wax by quick coagulation and precipitation of numerous impurities. Acid-treated wax, after one washing in hot water, has the same acid number as the original, but it appears to be somewhat harder and more brittle.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Valuable additions to collection of coleopterous larvae.--Larvae of the following species of Phyllophaga have been received, all definitely determined by rearing, through Bureau sources: P. submucida (Lec.), P. latifrons (Lec.), P. glaberrima Blanch., P. parvidens (Lec.), P. luctuosa (Horn); P. soror Davis, P. prunuculina (Burn.), and P. forsteri (Burn.). Also representatives of six different reared species were received from Paul O. Ritcher, of the University of Kentucky, who is engaged in a study of the Kentucky species. Mr. Ritcher has cooperated further with A. G. Boving by contributing data on specific variation and suggestions concerning the value of different characters in the larval classification of this group.

Host record for a species of Agromyzidae.--Specimens recently identified by C. T. Greene as Phytonyza atricornis Meig. were reared from mines in leaves of Cynara scolymus (artichoke) at Half Moon Bay, Calif., by W. H. Lange. This appears to be the first host record for this species.

The braconid genus Stantonia in North America.--Until recently species of the genus Stantonia have been recorded only from the Orient, Africa, and South America, and the host relationships of the group have been altogether unknown. A short time ago, however, S. C. Bruner submitted specimens from Cuba, reared from larvae of Larprosema indicata (F.) and during the past month a single specimen, reared from a cocoon of the codling moth in western Kentucky, was forwarded by Mr. Ritcher. Both species are new and are being described.

Notes on psocids recently submitted for determination.--Several species of Corrodentia, or psocids, which represent valuable additions to the Museum collections, have recently been received. A number of species of considerable interest have been collected in connection with the current survey of the insect fauna of peach orchards conducted by the Division of Fruit Insect Investigations. Two species, Nymphopsocus gravinympha (Weber) and Psoquilla slossonae (Banks), have been taken at Port Washington, N. Y., and New Orleans, La., respectively. These species occur in houses in situations similar to that of the common booklouse (Tractes divinatorius (Mull.)). The latter species is practically cosmopolitan and has been recorded from the flowers of plants and the nests of birds, as well as from dwellings. The above species of Nymphopsocus and Psoquilla are distinguished from psocids usually encountered by the reduced size of the wings and by different venation. In connection with biological studies of Recurvaria nilleri Busck, J. S. Yuill has submitted male specimens of Psocus subapterous Chapman taken in Yosemite National Park, Calif. This species has nearly wingless females and was described as new in 1930. The principal section of the Nearctic Corrodentia is now fairly well known, but a few sections are in need of revisionary study. Specific identities are often difficult to determine in the case of Neotropical Corrodentia.

Another United States record for a West Indian sugarcane leafhopper.--A single specimen of Saccharosydne saccharivora (Westw.), collected from weeds and grass in a peach orchard in Peach County, Ga., on August 28, 1937, was submitted for identification by William F. Turner. This is the third record of the species in the United States, the two previous ones having been from localities in Florida. Inasmuch as Peach County is in central Georgia, it seems probable that S. saccharivora is more widely distributed in the southeastern United States than has been thought.

A collection of scale insects received.--The R. A. Cooley collection of coccids, formerly held at the Montana State Agricultural Experiment Station, has just been deposited in the National Collection of Coccidae through shipment by H. B. Mills. This acquisition adds some species not previously contained in the National Collection and also the type specimens of some species hitherto represented only by determined specimens.

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